IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Applicant(s): B. Rodrig et al.
Case: 3-7
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Filing Date: July 31, 2000
Group: 2616
Examiner: Donald L. Mills

Title: IP Multicast in VLAN Environment

REPLY BRIEF

Commissioner for Patents
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Sir:

The remarks which follow are submitted in response to the Examiner's Answer dated October 5, 2007 in the above-identified application. The arguments presented by Appellants in the corresponding Appeal Brief dated June 6, 2007 are hereby incorporated by reference herein.

In the Answer at pages 13-21, the Examiner responds to various arguments raised by Appellants in the June 6, 2007 Appeal Brief with regard to the four grounds of rejection presented for review on appeal. The Examiner organizes his response regarding these grounds of rejection into respective sections denoted as Issue 1 through Issue 4, which Appellants will address individually below.

Issue 1

The Examiner has indicated that the §101 rejection is now withdrawn.

Appellants would like to point out that the Examiner reopened prosecution responsive to a previous Appeal Brief dated October 16, 2006 in the present application solely for the purpose of introducing the now-withdrawn §101 rejection. See the Office Action dated March 7, 2007.

Appellants believe that this prior reopening of prosecution solely to introduce a §101 rejection that was apparently without merit has created an unreasonable and excessive delay in the prosecution of the application.

Issue 2

With regard to independent claim 26, the Examiner at page 3, last paragraph, of the Answer argues that "the structural or physical limitations of the layer-2 bridging unit and multicast detector are not critical." The Examiner appears to be attempting to read these limitations out of the claim. Appellants believe that such an approach is clearly improper. The Examiner must give patentable weight to each and every limitation of the claim. The claim at issue is directed to a switch that comprises a plurality of ports, a layer-2 bridging unit and a multicast detector. The Examiner argues that intermediate device 221 of FIG. 2A of Gleeson includes such elements. However, Gleeson fails to disclose that the intermediate device 221 includes such elements.

The Examiner places great emphasis on the fact that the summary provided by Appellants at page 3, second-to-last paragraph, of the June 6, 2007 Appeal Brief identifies layer-3 switches 34X, 34Y and 34T as possible illustrative embodiments of the switch recited in claim 26. The Examiner states that each such element 34X, 34Y and 34T is merely a "blank box" and from this point apparently concludes that he can establish anticipation of the claimed switch by intermediate device 221 of Gleeson without showing that the intermediate device 221 actually contains the recited layer-2 bridging unit and multicast detector. Appellants believe that this analysis is improper. Appellants initially note that the Examiner ignores the particular part of the summary of claim 26 that cites to page 9, lines 13-18, of the present specification. This portion of the specification provides as follows:

> In some embodiments of the invention, switches 34 comprise a bridging unit which automatically bridges (in layer-2) unicast layer-2 packets not directed to the receiving switch and packets carrying layer-2 multicast and/or broadcast MAC addresses. In some embodiments of the invention, switches 34 comprise a multicast detector which identifies

multicast packets which should not be bridged in layer-2, and prevents the bridging unit from forwarding the identified packets.

Thus, each of the illustrative elements 34X, 34Y and 34T identified by Appellants in their summary is not merely a "blank box" as argued by the Examiner. It is a layer-3 switch that in accordance with the claimed arrangement and the above-quoted portion of the specification comprises particular elements, namely, a layer-2 bridging unit and a multicast detector. As Appellants indicated in their June 6, 2007 Appeal Brief, there is no teaching or suggestion in Gleeson to the effect that the intermediate element 221 relied upon by the Examiner actually contains the recited elements.

It should be noted that claim 26 calls for a switch comprising a particular type of layer-2 bridging unit, namely, one which bridges packets between ports of the switch responsive to their destination MAC address and their VLAN.

The Examiner relies on the teachings in column 18, lines 53-64, as allegedly showing that intermediate device 221 includes the particular type of layer-2 bridging unit recited in the claim. However, this relied-upon portion of Gleeson relates to configuring a message in accordance with the frame structure shown in FIG. 6. It does not teach or suggest that any particular intermediate device includes a layer-2 bridging unit that bridges packets between ports of that device in the manner recited.

It should also be noted that claim 26 calls for a switch comprising a particular type of multicast detector, namely, one which identifies a group of at least some of the IP multicast routing related packets received by the switch, the group including IGMP queries, and prevents the layer-2 bridging unit from bridging the identified packets at least through ports of the switch which do not lead to at least one neighboring layer-3 switch or router. This limitation specifies a particular interaction between the multicast detector and layer-2 bridging unit, that is, the former preventing the latter from performing certain bridging functions.

The Examiner relies on the teachings in column 9, lines 46-50, and column 10, lines 44-47, of Gleeson as allegedly showing that intermediate device 221 includes the particular type of

multicast detector recited in the claim, as well as its interaction with an internal layer-2 bridging unit. However, the relied-upon portion at column 9, lines 46-50, relates not to the operation of intermediate device 221, but to the operation of an entirely separate element, namely, a multicast controller 306 that is part of a multicast control engine 300 implemented within the multicast network device (MND) 226 or 228 of FIG. 2A. The relied-upon portion at column 10, lines 44-47, appears to be directly contrary to the limitations in question by stating as follows, with emphasis supplied:

> Nonetheless, it should be understood that all intermediate devices 220-223 are instructed (e.g., pursuant to the IGMP protocol) to forward all multicast messages to the corresponding MND 226, 228.

The Examiner also argues that the intermediate device 221 "prevents IGMP queries from transmission through ports 1, 4, and 5, which do not lead to a neighboring router." However, the claim language calls for a multicast detector that prevents a layer-2 bridging unit from bridging identified packets at least through ports of the switch which do not lead to at least one neighboring layer-3 switch or router. In FIG. 2A of Gleeson, port 1 of intermediate device 221 is connected to another intermediate device 220. Thus, the forwarding of all multicast messages from the intermediate device 221 to the MND 226 does not appear to prevent layer-2 bridging in the manner argued by the Examiner.

In view of the foregoing, Appellants respectfully submit that the Gleeson reference fails to teach or suggest a switch having the particular elements recited in claim 26. The anticipation rejection is therefore improper and should be withdrawn.

With regard to independent claim 38, the Examiner states that the arguments presented by Appellants in the June 6, 2007 Appeal Brief are non-responsive. However, Appellants have adequately addressed the anticipation rejection by arguing that the specific element of Gleeson relied upon by the Examiner, namely MND 226, does not comprise a layer-3 switch of the particular type recited in the claim.

Claim 38 calls for a layer-3 switch that includes at least one VLAN interface which does not have an associated IP router interface, and a layer-3 output unit which directs IP packets with a MAC source address of the switch through the at least one VLAN interface. The claim further specifies that the layer-3 output unit directs packets through the at least one VLAN interface, with an IP source address associated with a different VLAN interface of the switch. An illustrative embodiment is described in the specification at page 15, lines 13-22.

The Examiner argues that the MND 226 in FIG. 2A of Gleeson is a layer-3 switch that includes at least one VLAN interface which does not have an associated IP router interface. However, nowhere in Gleeson is it stated that the MND 226 has a VLAN interface that does not have an associated IP router interface. In the above-noted illustrative embodiment described in the present specification, such a configuration can arise when, for example, a switch 34 has a physical port that is used only for layer-2 bridging and therefore does not have an associated IP address. The MND 226 is not described in Gleeson as having a VLAN interface which does not have an associated IP router interface. The Examiner notes that the MND 226 has VLAN interfaces for interfacing to particular VLANs denoted Red (R), Green (G) and Blue (B). However, Gleeson in FIG. 3 teaches that each of these logical VLAN interfaces 305 interfaces with trunk 231 over a common trunk/port physical interface 302. See Gleeson at column 9, lines 35-45. Thus, to the extent the MND 226 has an IP router interface with trunk 231, as argued by the Examiner, each of the VLAN interfaces of MND 226 identified and relied upon by the Examiner also appears to have an associated IP router interface.

The Examiner further argues that MND 226 includes the recited layer-3 output unit which directs IP packets with a MAC source address of the switch through the VLAN interface, which does not have an associated IP router interface, using an IP source address associated with a different VLAN interface of the switch. The Examiner relies on the teachings in column 12, lines 36-44, of Gleeson and the forwarding of messages from port 1 of MND 226 to host 33 in FIG. 2A. However, again with reference to FIG. 3, messages that are passed to host 33 on LAN 236 are delivered via trunk/port physical interface 304, and thus are not directed to the host 33 through any one of the VLAN interfaces identified by the Examiner.

In view of the foregoing, Appellants respectfully submit that the Gleeson reference fails to teach or suggest a switch having the particular elements recited in claim 38. The anticipation rejection is therefore improper and should be withdrawn.

Issue 3

With regard to independent claim 1, the Examiner continues to rely on the VLAN table 144 in FIG. 4 of Varghese as allegedly teaching the limitations relating to the layer-3 multicast routing table which relates to each of the segments of a divided LAN separately. The Examiner argues that the term "segment" is not defined, pointing to the summary provided by Appellants at page 2 of the June 6, 2007 Appeal Brief. However, the specification provides additional teachings that clarify the meaning of this claim term. See, for example, the description at page 4, lines 7-16, and page 10, line 25, to page 11, line 12. From the specification it is apparent that a "segment" of a divided LAN is a sub-portion of the LAN. This is consistent with the claim language, which calls for dividing a LAN into a number of segments that is greater than the number of VLANs in the network.

The Examiner states that the recited "segment" in claim 1 may be "the link between the bridge port and destination device" in Varghese. Thus, with reference to FIG. 4 of Varghese, the Examiner apparently argues that the outputs of the bridge ports 8, 12, 9 and 15 are directly connected only to respective Stations A, B, C and D and therefore such links constitute "segments" as the latter term is used in claim 1. However, there is no teaching or suggestion in Varghese to the effect that there are direct links between the bridge ports and only the identified individual stations shown in FIG. 4. To the contrary, Varghese teaches with reference to FIG. 1 that each "single line" output of bridge 102 represents one of twelve individual LANs. See Varghese at column 4, lines 38-41.

Thus, it appears that each of the single line outputs from bridge 142 in FIG. 4 is also representative of a corresponding individual LAN. Varghese teaches to create VLANs as combinations of these multiple individual LANs, but does not teach or suggest dividing a given LAN into a number of segments larger than the number of VLANs. The designation of a particular station adjacent each of the single line outputs of bridge 142 in FIG. 4 simply indicates that the

station is considered part of the corresponding individual LAN that is represented by that single line output. There is no "link between the bridge port and destination device" explicitly shown in Varghese, contrary to the assertion of the Examiner. Moreover, Appellants respectfully submit that the Examiner is incorrect in arguing that the VLAN table 144 "stores the individual relationship between each bridge port and its attached destination device." As indicated above, it is not merely a single destination device that is attached to each bridge port in Varghese but instead an individual LAN. Thus, each of the bridge ports in bridge 142 could clearly have multiple stations associated therewith. The VLAN table 144, as Appellants have argued in the June 6, 2007 Appeal Brief, stores a mapping between particular source addresses and the corresponding bridge ports. As each bridge port is associated with an individual LAN, and multiple sources could clearly be part of each LAN, the VLAN table 144 is not a table that relates separately to each of a plurality of segments of a divided LAN.

Accordingly, it is believed that the combined teachings of Gleeson and Varghese fail to meet the limitations of claim 1.

As to motivation to combine Gleeson and Varghese, Appellants note that the claimed arrangements can provide particular advantages. For example, by dividing a LAN into a number of segments that is greater than the number of VLANs, and creating a multicast routing table that relates to each of the divided segments separately, at least one of the VLANs will include multiple segments. This allows multicast packets to be forwarded through VLAN segments rather than through entire VLANs, potentially reducing the distance over which such packets may be unnecessarily forwarded. See the specification at, for example, page 4, lines 7-16. These advantages are not provided by the proposed combination. Moreover, there appears to be no need for the VLAN table 144 of Varghese in the multicast distribution system of Gleeson. Gleeson provides no description relating to bridging. The purpose of the VLAN table 144 in Varghese is to keep track of which sources are associated with which VLANs, and by implication which bridge ports, in a network bridge that associates different bridge ports with different VLANs. Such a table does not appear to be needed in, for example, the MND 226 of FIG. 2A in Gleeson, and the Examiner does not indicate how such a table could be adapted for use in the MND 226, given the configuration of

the latter device as shown in FIG. 3. Accordingly, it appears at the very least that one skilled in the art would not be motivated to adapt the VLAN table 144 to the Gleeson system, and further that such a combination might in fact be unworkable.

Appellants respectfully submit that the proffered general statements regarding "reducing traffic flow and bandwidth" and "reduced network congestion and decreased costs" fail to provide sufficient objective motivation for the combination and, rather, are conclusory statements of the sort rejected by both the Federal Circuit and the U.S. Supreme Court. See KSR v. Teleflex, 127 S. Ct. 1727, 1741 (2007), quoting In re Kahn, 441 F. 3d 977, 988 (Fed. Cir. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.").

With regard to independent claim 14, the Examiner relies primarily on the intermediate device 221 and MND 226 of FIG. 2A in Gleeson. More particularly, the Examiner argues that a packet received in MND 226 from port 2 of intermediate device 221 is routed to host 33 through port 2 of the MND 226. However, the claim at issue calls for receiving a multicast packet by the switch through a first physical port on a first VLAN, and routing the multicast packet in layer-3 out a second physical port of the switch, on the first VLAN. It is clear from FIG. 3 of Gleeson that the LAN 236, which includes the host 33, uses a port 304 that is separate from port 302 that is utilized by the VLANs. Accordingly, packets routed to host 33 via port 2 of MND 226 are not routed out a second physical port on the first VLAN as recited in the claim. Nor does Gleeson disclose the bridging of a multicast packet in layer-2 through a third physical port of the MND 226. To the contrary, the MND 226 as disclosed in Gleeson only appears to include two physical ports, denoted 1 and 2 in FIGS. 2A and 3.

Accordingly, the collective teachings of Gleeson and Varghese fail to meet the limitations of claim 14.

With regard to independent claim 48, the Examiner argues that Varghese teaches the recited limitations relating to operation of a layer-3 multicast routing table in a first mode in which interfaces are identified by both a VLAN and a port or in a second mode in which interfaces are

identified only by a VLAN. More specifically, the Examiner states that the first mode is described at column 8, lines 15-19, and the second mode is described at column 7, lines 35-36. However, these relied-upon passages relate to two separate implementations, one of which does not use the VLAN table 144, and not two different modes of operation of the same multicast routing table. In the implementation described at column 7, lines 35-36, there is no VLAN table 144. Instead, the router 140 simply uses a different source address X and Y for each of the two VLANs, such that there is no need for the table. The VLAN table 144 is only used in what Gleeson refers to as Method 2, and it is the updating of that table that is referred to in the relied-upon passage at column 8, lines 15-19. Thus, there is no multicast routing table in Varghese that is capable of operating in first or second modes as recited. Moreover, the VLAN table 144 does not identify interfaces according to both a VLAN and a port as recited, but instead simply identifies which source addresses are associated with which VLANs. See column 7, line 63, to column 8, line 5. The table does not identify which VLANs belong to which ports, as that information is established via a declaration using a management interface with the bridge and apparently stored elsewhere. See column 4, line 65, to column 5, line 6.

Accordingly, the collective teachings of Gleeson and Varghese fail to meet the limitations of claim 48.

Issue 4

With regard to independent claim 45, Appellants respectfully submit that the Examiner is misinterpreting the teachings at column 13, lines 52-62, of Gleeson. This portion of Gleeson states that the controller 306 may perform conventional routing functions, such as decrementing a TTL value. The Examiner interprets this statement as teaching the forwarding of a packet without changing the TTL value, as recited in claim 45. Such an interpretation is unsupportable. The language in Gleeson simply identifies the decrementing of a TTL value as one type of conventional routing function that may be performed by the controller 306. Thus, if one were to adopt this specific Gleeson teaching, one would configure the controller 306 to decrement the TTL value, which is directly contrary to the limitations in question. The language in Gleeson does not support

the argument of the Examiner to the effect that forwarding without changing the TTL value is another conventional technique that may be used. Gleeson makes no teaching or suggestion whatsoever regarding forwarding without changing the TTL value. The Examiner states that such forwarding is "[i]n accordance with traditional routing functions," but there is no support at all in Gleeson for this position. The Examiner appears to be attempting to argue prior art that is not of record, which is clearly improper.

For the reasons identified above and in their June 6, 2007 Appeal Brief, Appellants respectfully submit that claims 1-17, 26-43 and 45-48 are allowable over the prior art of record.

Respectfully submitted,

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